3rd Management Committee Meeting
Barcelona, 21 June 2013

COST Action TD1105
EuNetAir - European Network on New Sensing Technologies for Air Pollution Control and Environmental Sustainability

Challenges for a New Air Quality Directive

the role of monitoring and modelling techniques

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2008 Air Quality Directive

Guidelines and requirements for:

o Air quality measurements
o Air quality assessment
o Limit and target values for air pollutants
o Public information and reporting

OBJECTIVES

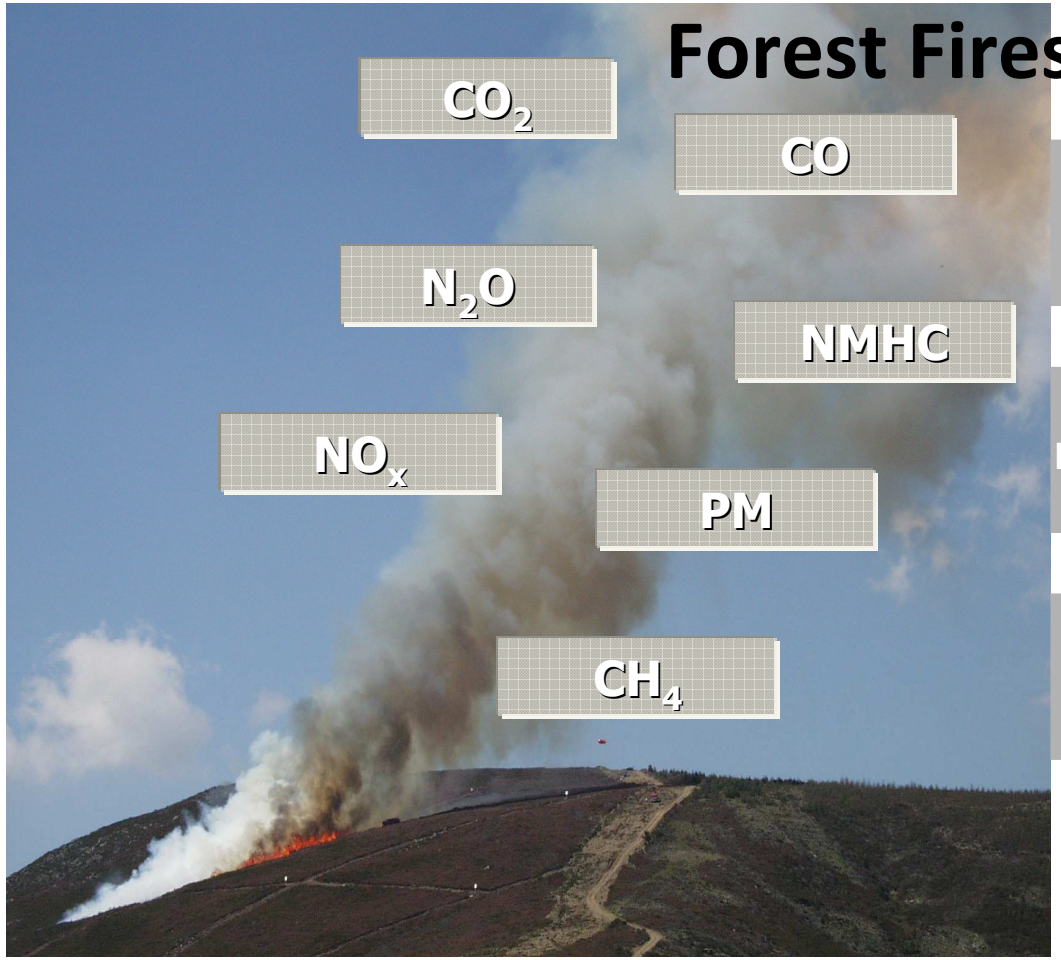
- To **protect human health**, paying particular attention to sensitive populations;
- To **minimise harmful effects** on the environment as a whole (ecosystems, vegetation, materials and ozone layer);
- To **prevent air pollution** in advance;
- To **improve the monitoring and assessment** of air quality;
- To **provide information** to the general public.

2008 Air Quality Directive

major goal

to protect human health

Forest Fires | example



global scale → **climate change**

regional scale → **photochemical pollution**

local scale → **acute air quality problems**

Smoke has to be considered as one of the several disturbing effects of forest fires.
Its impacts on air quality and human health can be considerable

Objective

Can a fire-fighter be exposed to critical air pollutants levels?

What could be the effects on his health?

how?

Monitoring

smoke exposure measurement

PM2.5
NO_2
CO
VOC

10 fire-fighters

+ meteorology + air quality

Equipment criteria:

-toughness,
- weight,
- possibility of continuous data acquisition,
- easiness of operation.

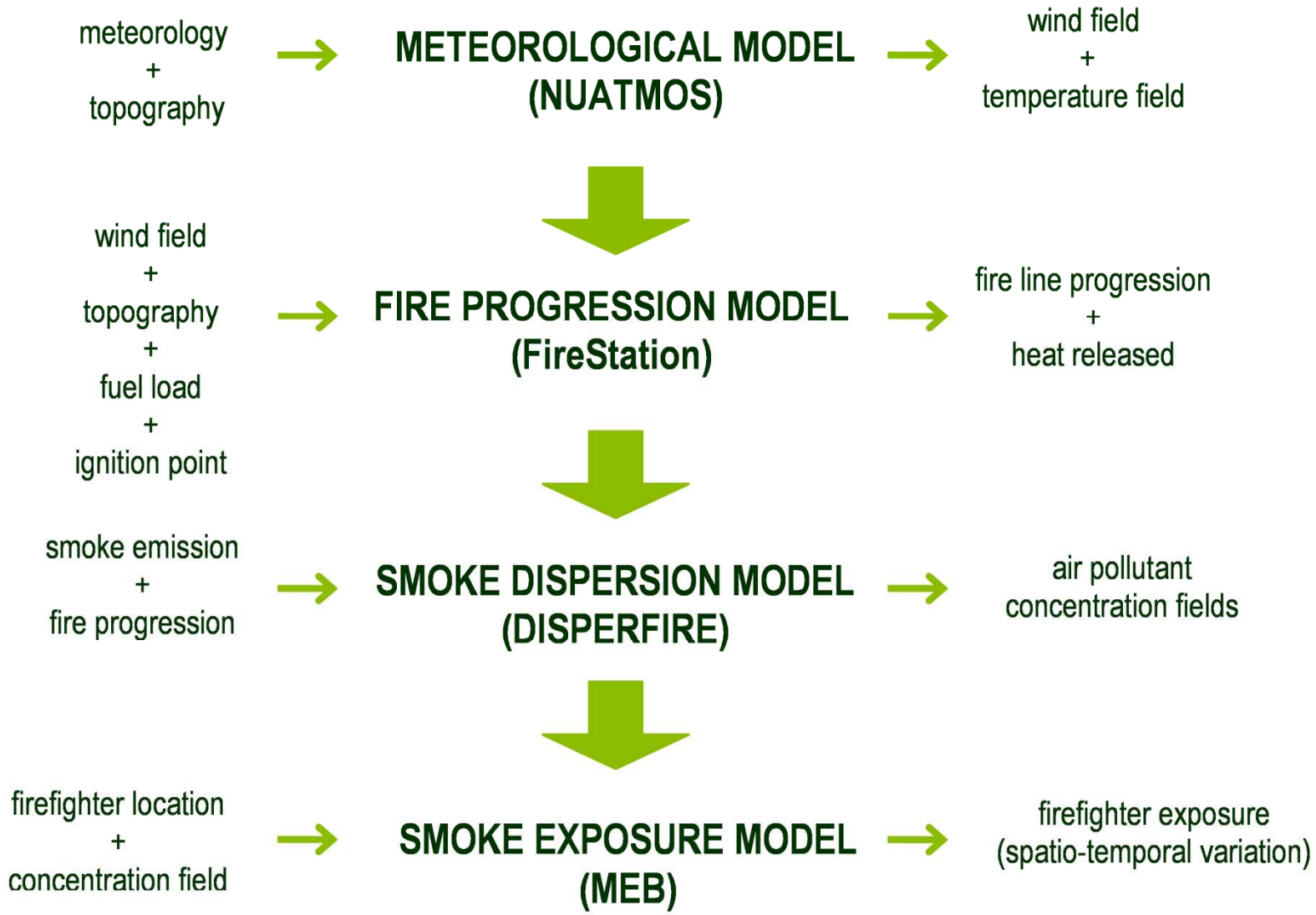
BW Micro 5 PID
(VOC, NO_2)

BW
GasAlertextreme
(CO)

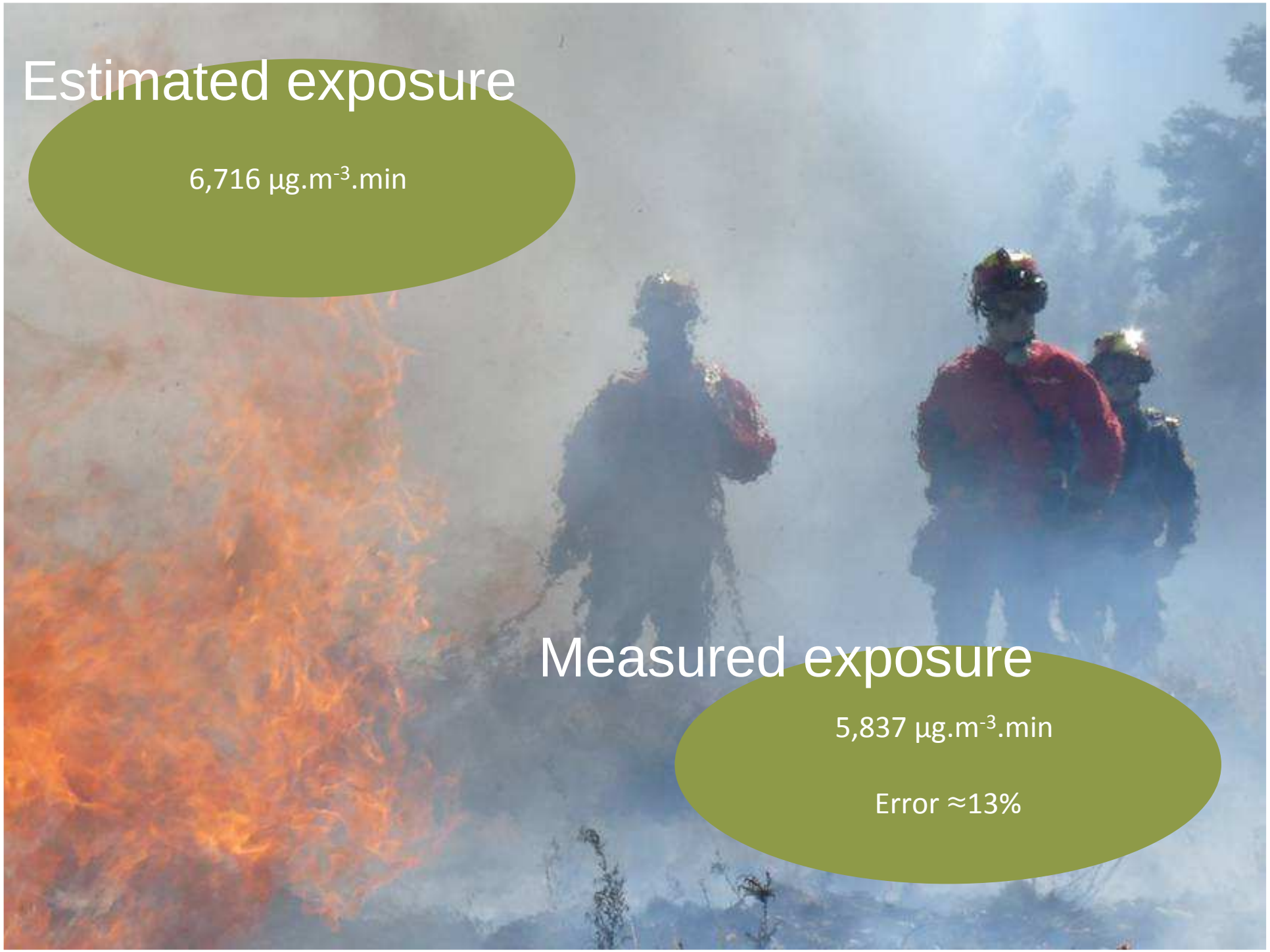
TSI AM510
(PM2.5)

But, can we go measuring anytime we need to know exposure and health effects?

Modelling!!!!



(IJWF, Valente et al., 2007)


Estimated exposure
6,716 µg.m-3.min
Measured exposure
5,837 µg.m-3.min
Error ≈13%

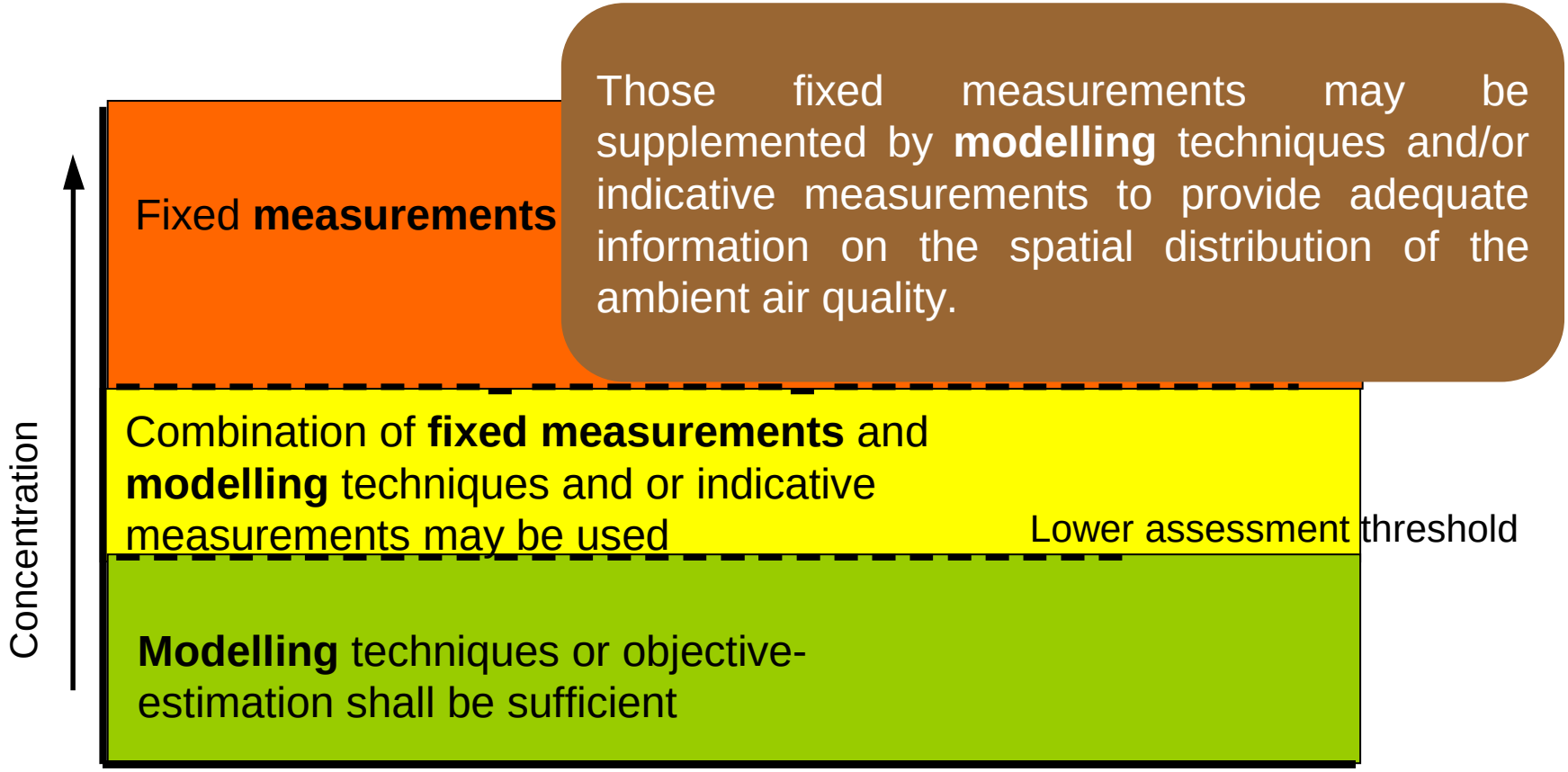
2008 Air Quality Directive

major goal

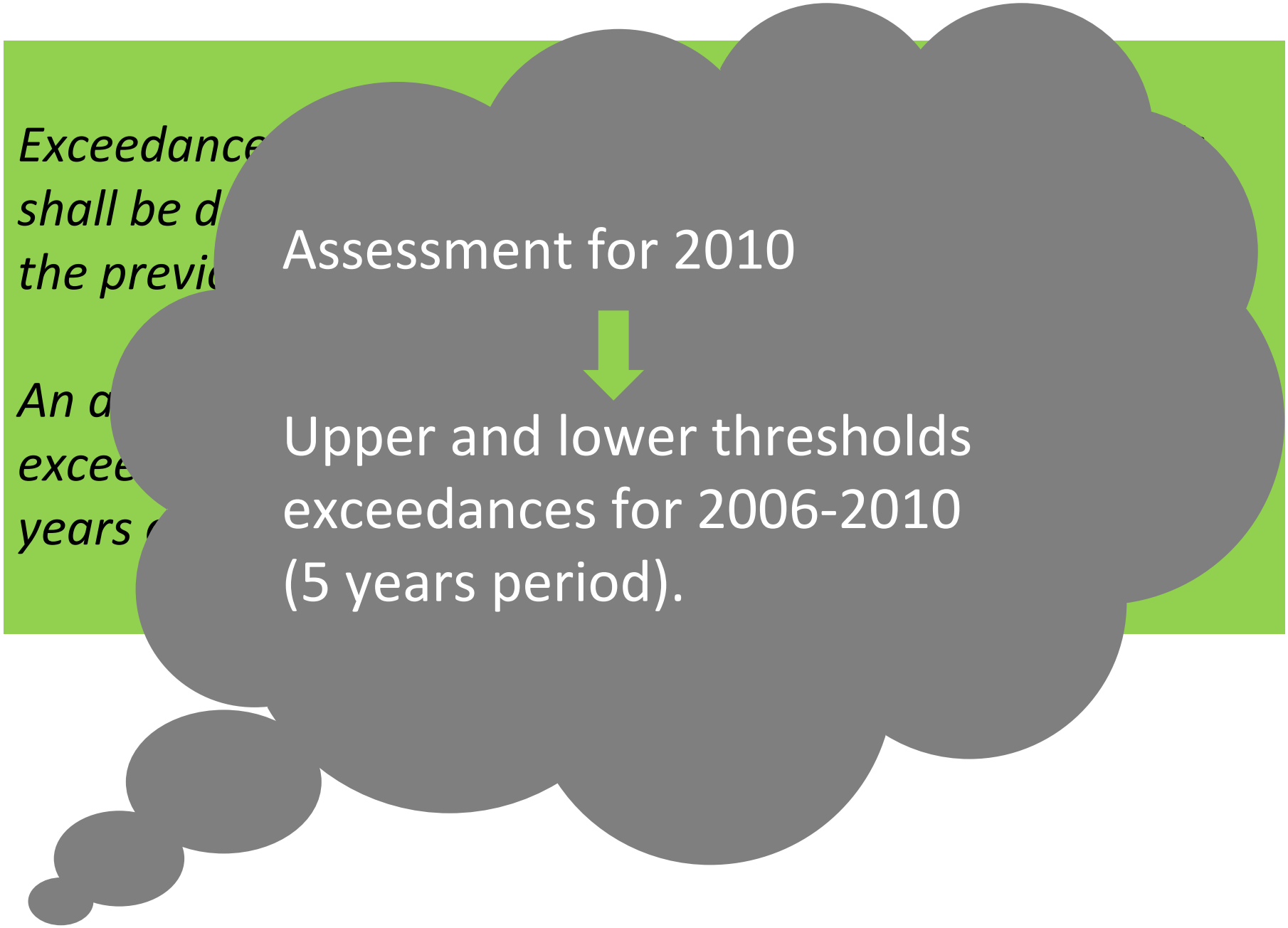
improve the monitoring and assessment of air quality

2008 Air Quality Directive| air quality assessment

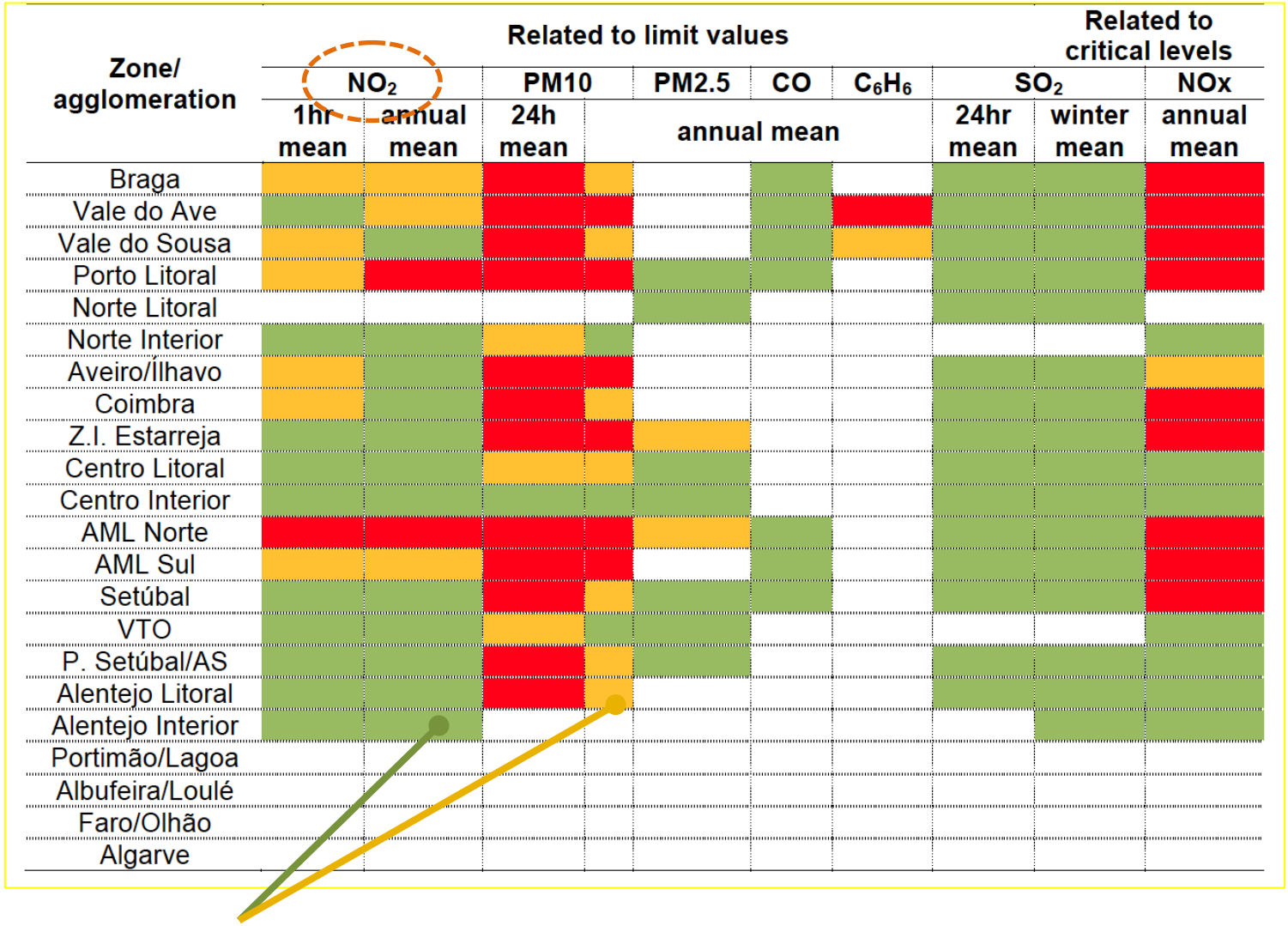
Assessment strategy depends on upper and lower assessment thresholds



SO_2, NO_2, NOx, PM10, PM2.5, Pb, C_6H_6, CO

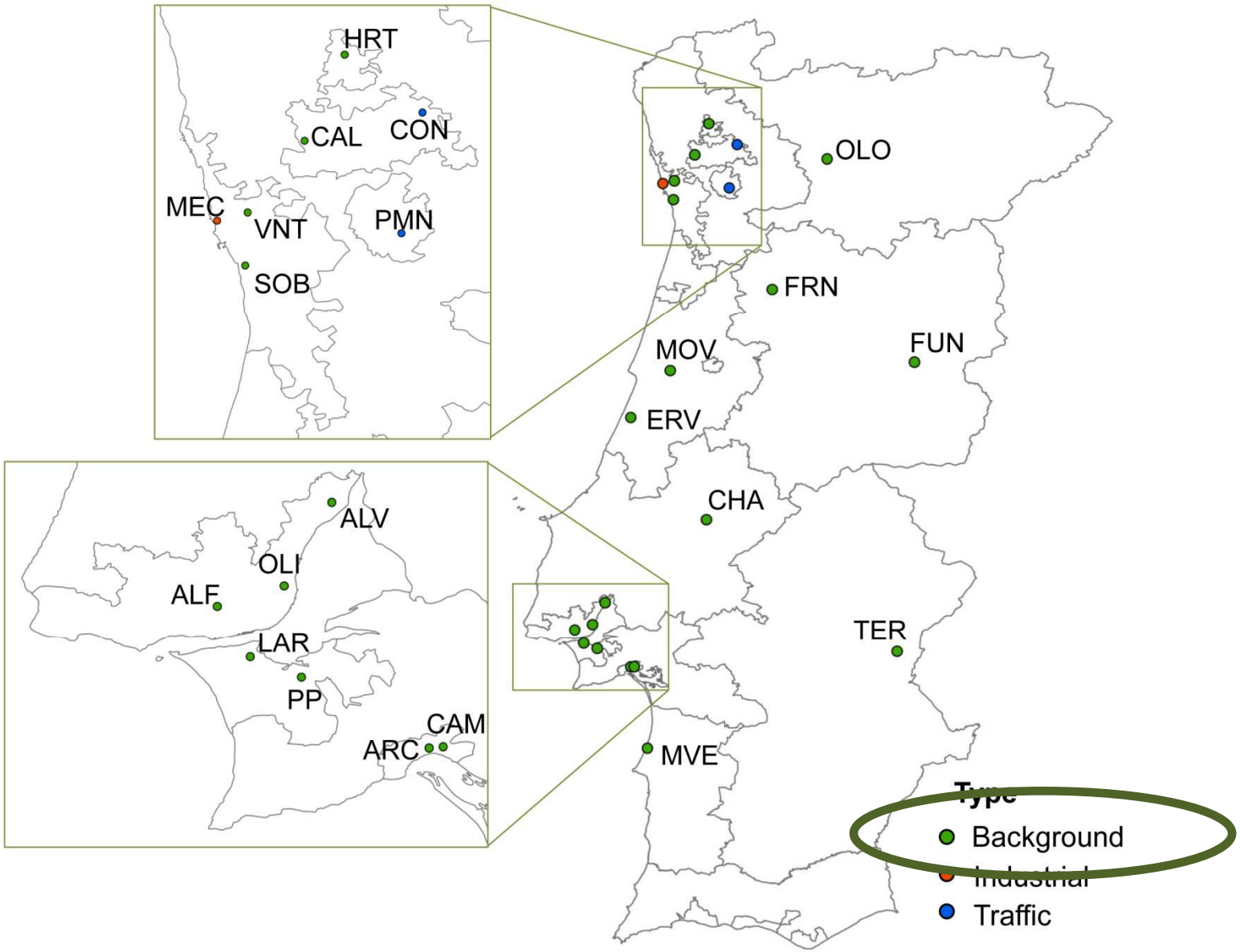

Exceedance
shall be d
the previ
An a
excee
years
Assessment for 2010
Upper and lower thresholds
exceedances for 2006-2010
(5 years period).

Portugal data | example



For zones < UAT it is possible to use **combined data** from modelling and monitoring as a **supplementary assessment method!**

Monitoring stations



Bias-correction technique

a **multiplicative ratio** correction

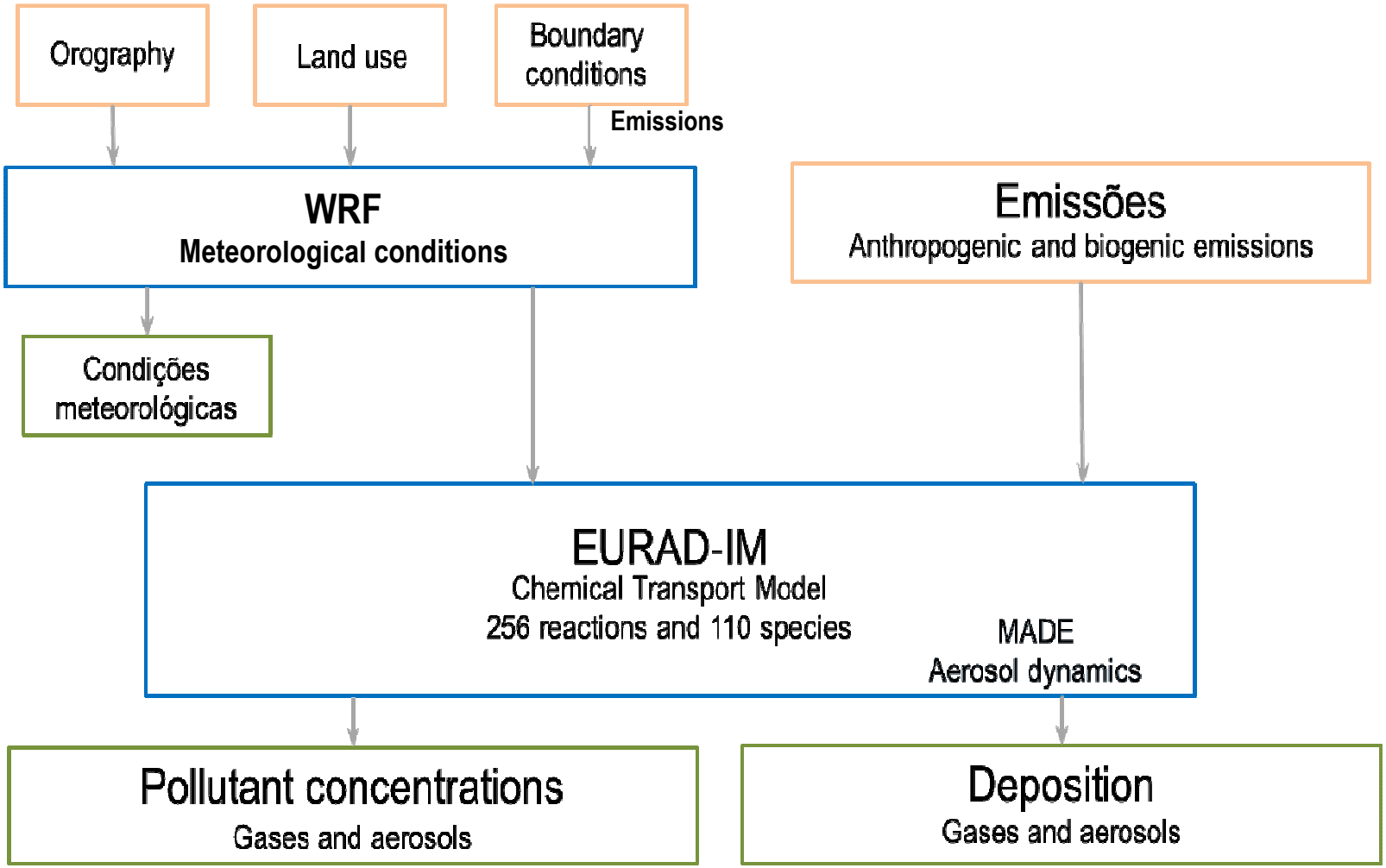
$$C^{corrected}(h,day) = \frac{\sum_{ndays} C^{obs}(h,day)}{\sum_{ndays} C^{model}(h,day)} \times C^{model}(h,day)$$

After BIAS correction, model results have a decrease > 70% on the average systematic error

It improves the modelling data and **combines** pollutant concentration values from **fixed monitoring station** and from a **numerical modelling system**

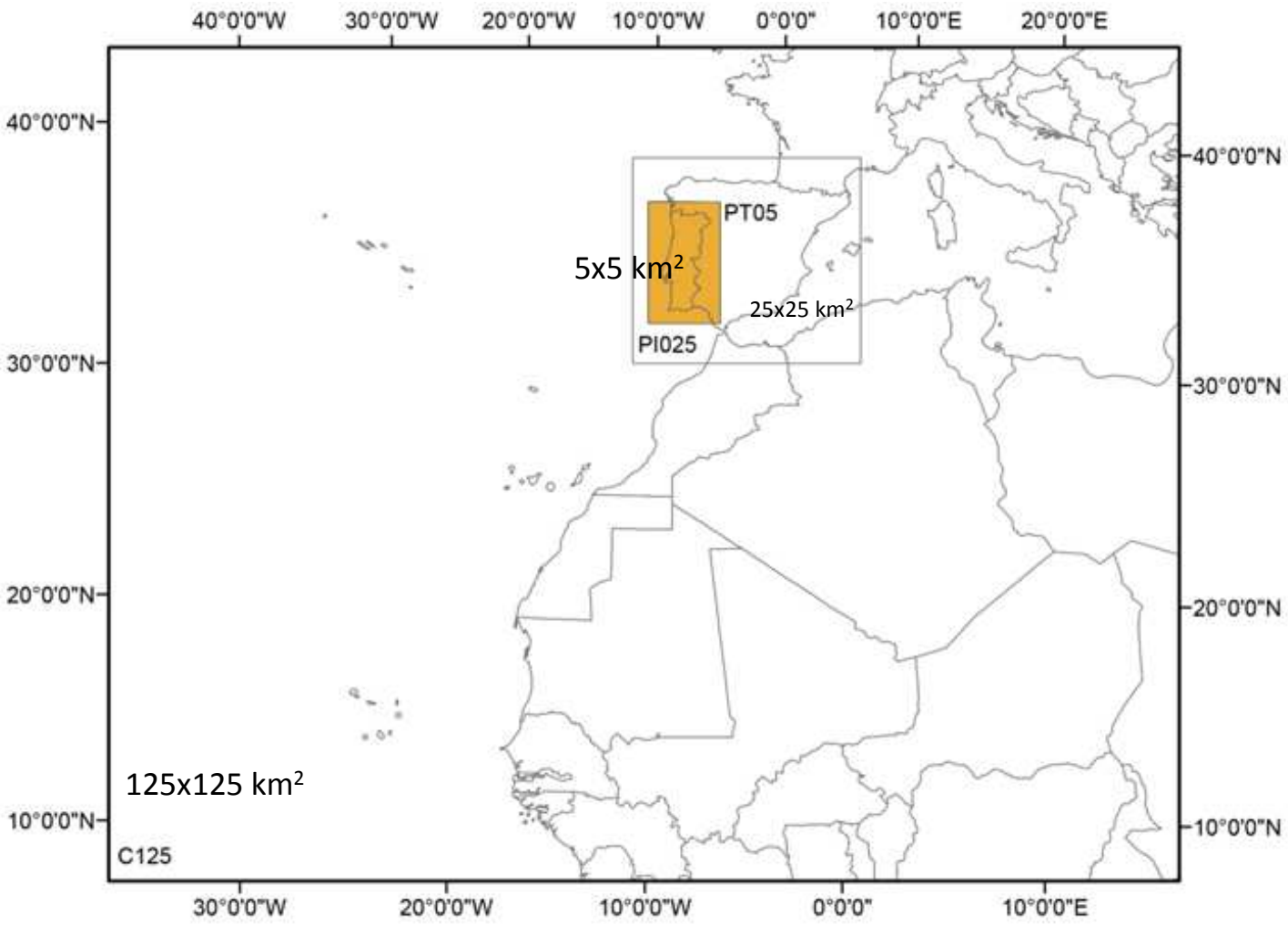
Air quality modelling system

WRF-EURAD-IM



Air quality modelling system

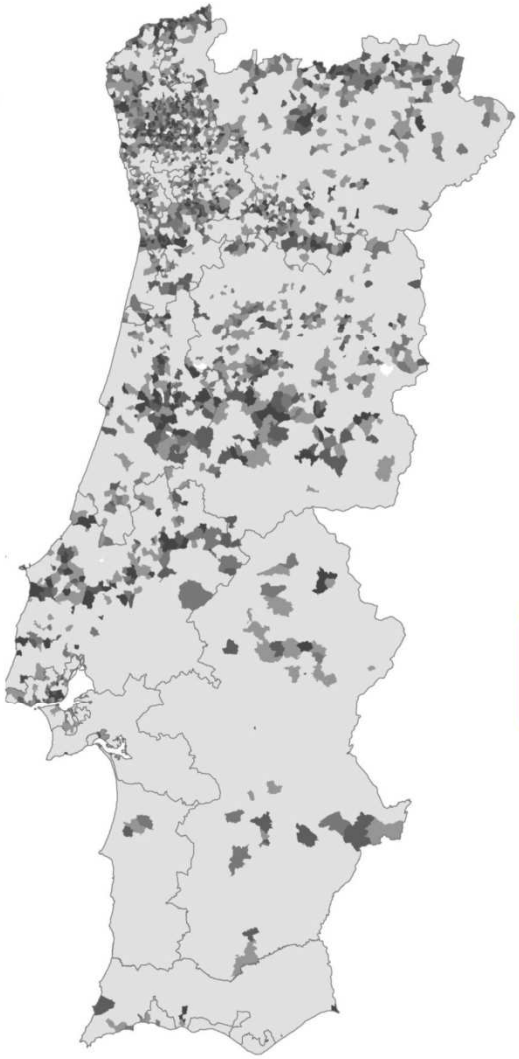
Simulation domains



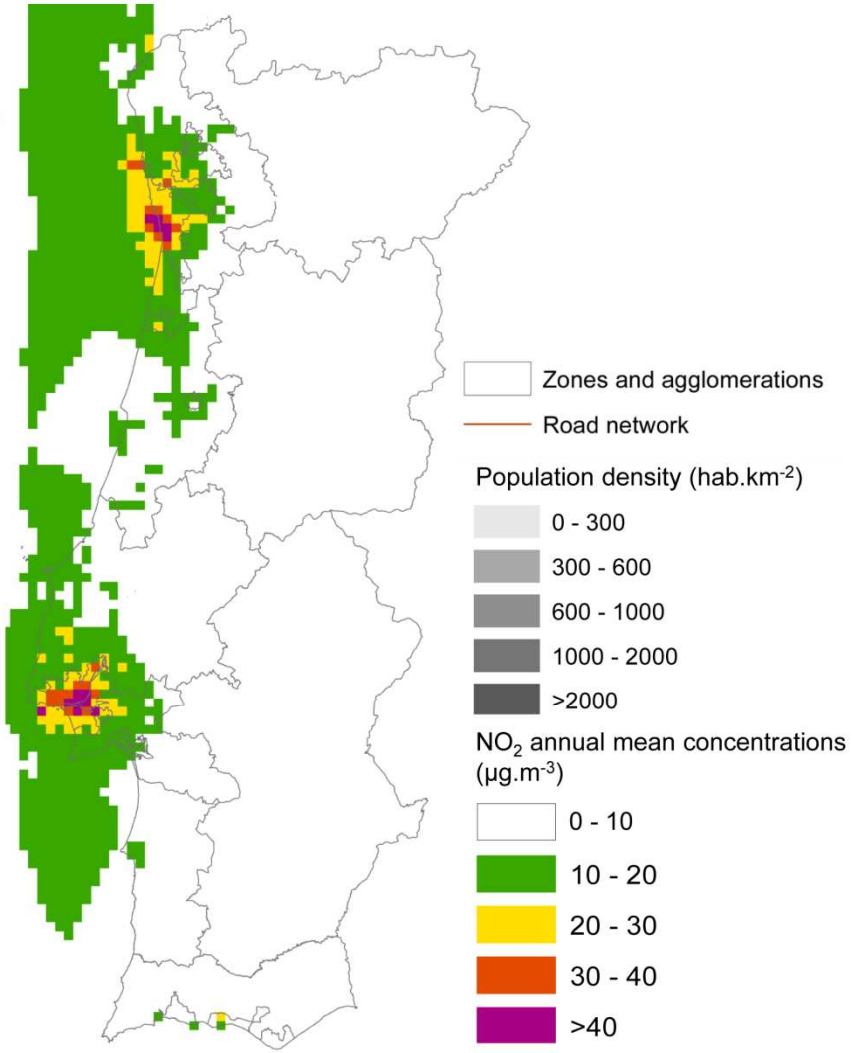
Data needed to AQ supplementary assessment method

Road network

Population



Concentration fields

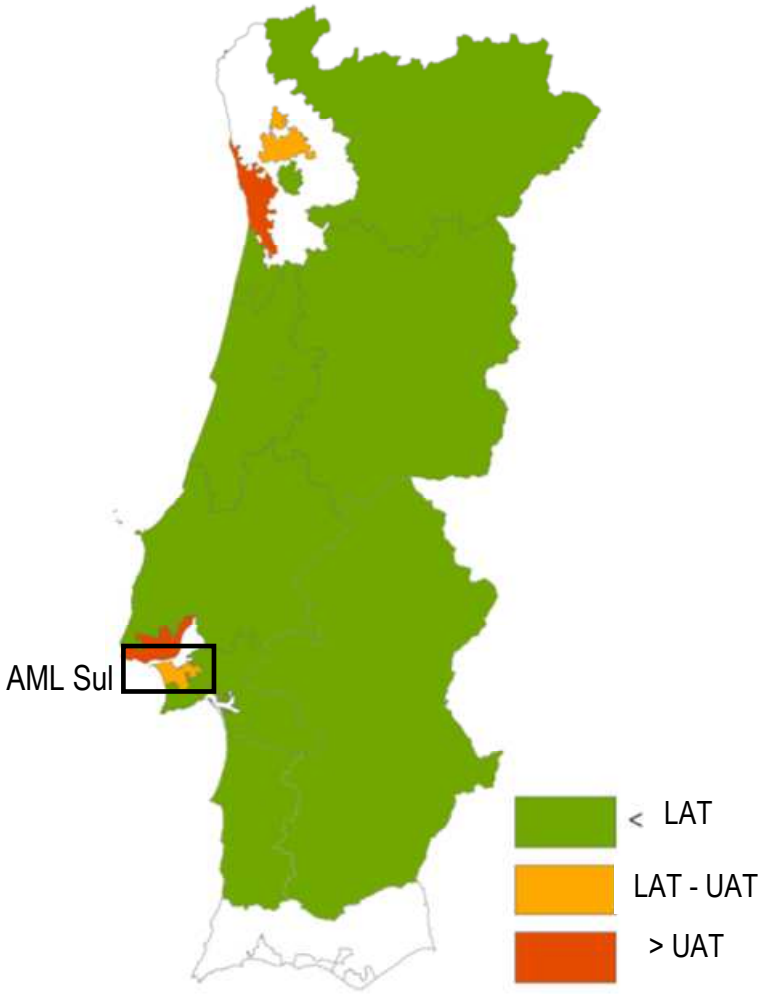


AQ assessment | NO_2

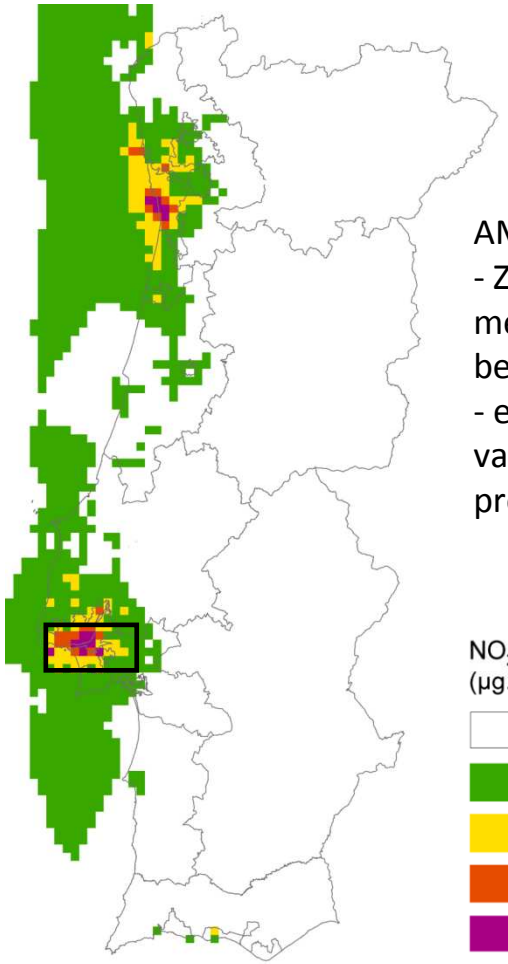
data combination from monitoring and modelling systems

2010 annual mean

monitoring (2006-2010)



modelling



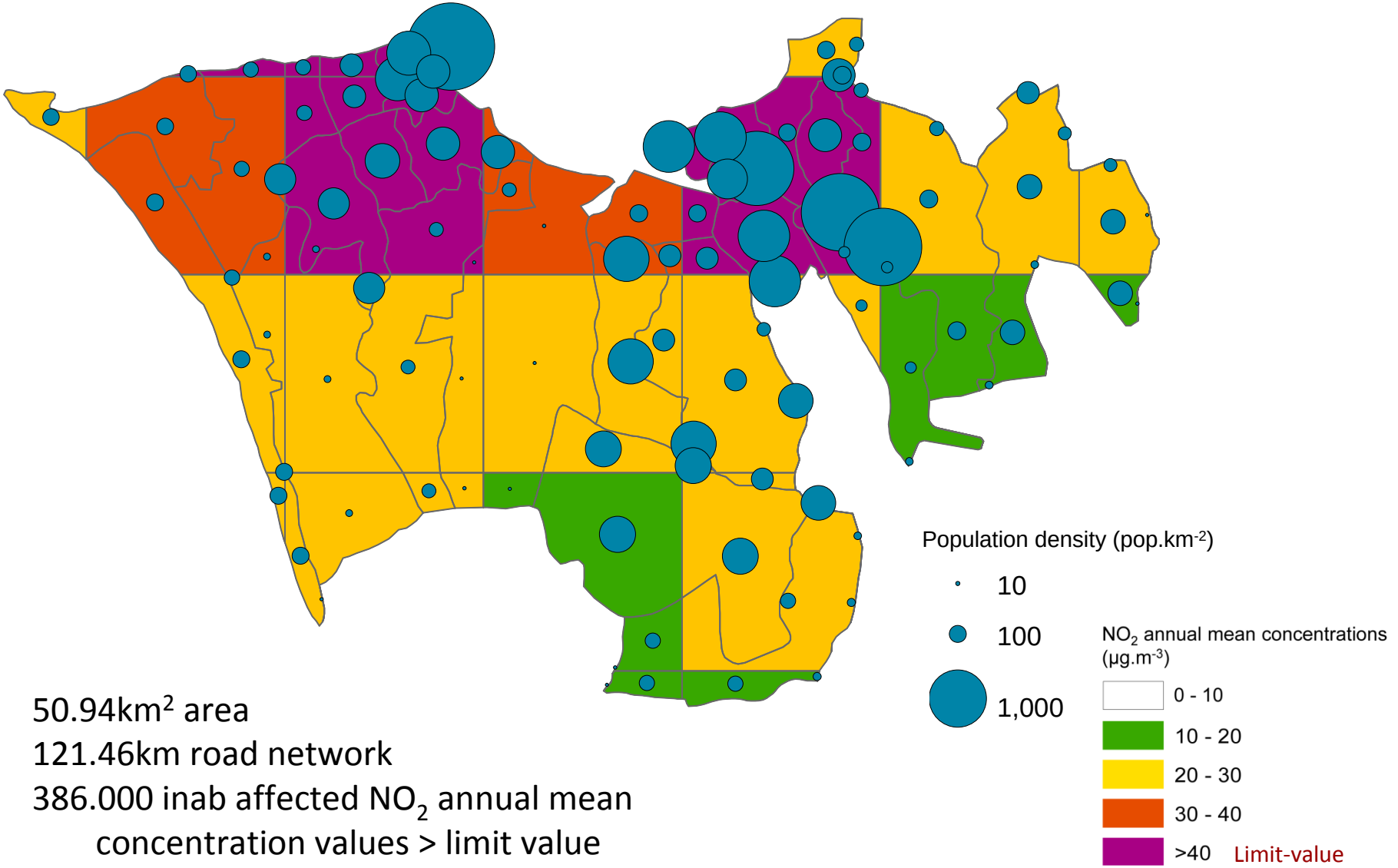
AML-Sul:
- ZA with NO_2 annual mean concentration below UAT;
- exceedance of limit value for human health protection.

NO_2 annual mean concentrations ($\mu g.m^{-3}$)

- 0 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- >40 Limit-value

AQ assessment | NO_2

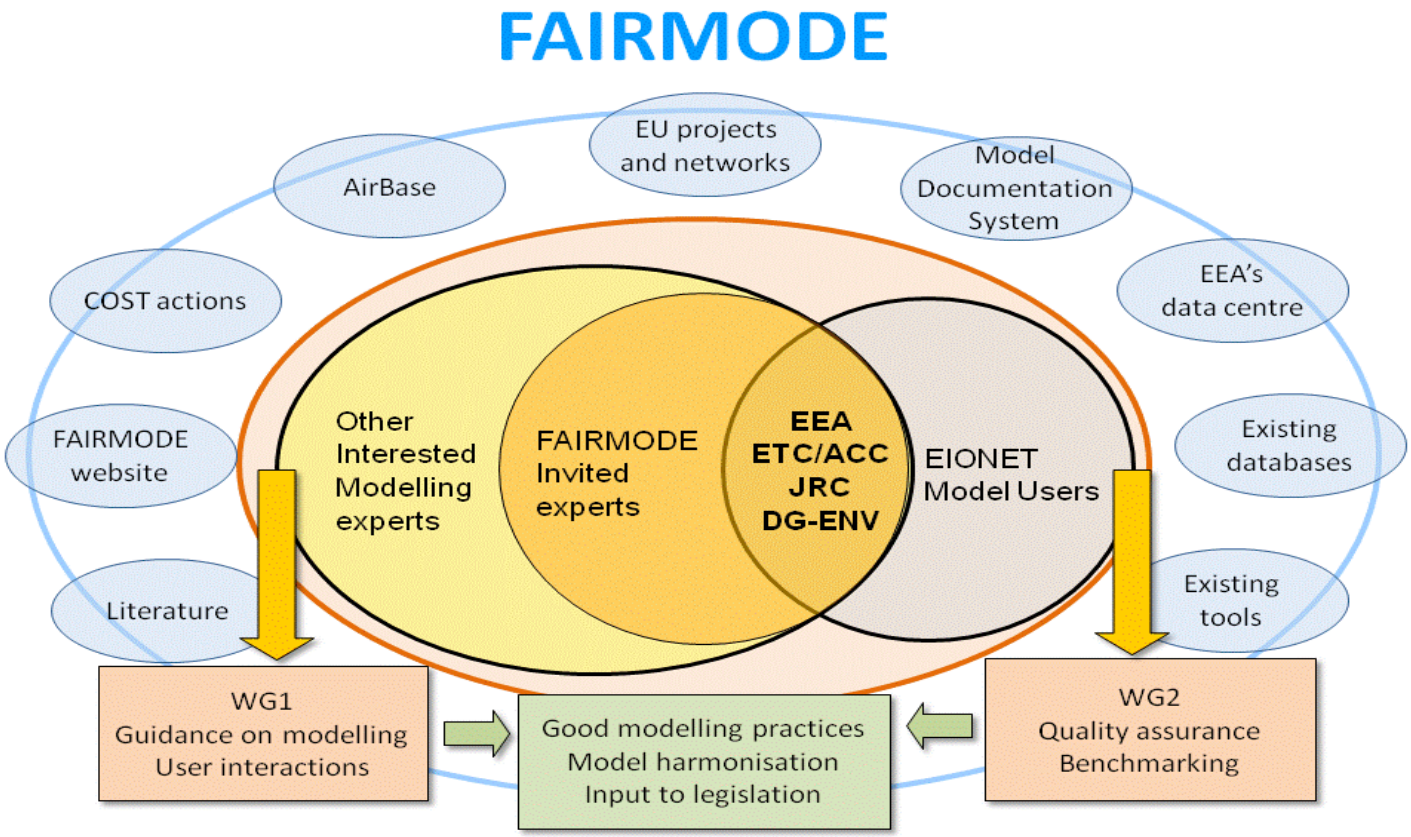
2010 annual mean – AML Sul



- 50.94km^2 area
- 121.46km road network
- 386.000 inab affected NO_2 annual mean concentration values > limit value

FAIRMODE | **F**orum for **AIR** Quality **MOD**elling in **E**urope

Joint response action of the European Environment Agency to promote and support the harmonised use of models by EU member countries, with emphasis on their application to the European Air Quality Directive.



FAIRMODE | recommendations for the new AQ Directive

1. ON THE USE OF MODELS FOR REGULATORY PURPOSE AND TO SUPPORT AIR QUALITY POLICY

FAIRMODE **strongly recommends the use of models** for air quality applications.

The AQD text relating to these applications should be clarified:

1. Assessment of AQ levels to establish the extent of exceedances and population exposure
2. Forecasting air quality levels for short term mitigation and public information
3. Source allocation to determine the origin of exceedances and basis for planning strategies
4. Development and assessment of plans and measures to control AQ exceedances

FAIRMODE | recommendations for the new AQ Directive

2. MODEL QUALITY OBJECTIVES

recommends a **revision of the data quality objective for modelling**

3. FORUM OF EU AQ REGULATORY MODELLING

recommends that in parallel to what has already been established for the monitoring of air quality, **competent authorities for modelling activities are nominated by the Member States** (quality assurance of modelling)

4. QUALITY ASSURANCE AND CONSISTENCY OF EMISSION INVENTORIES

recommends to investigate and **improve the compilation, consistency and quality assurance of emissions data** suitable for AQ modelling under the directive

The use of models is strongly recommended for:

- Designing monitoring networks when models are used in combination with monitoring

- Determining the number of fixed monitoring sites that are required

Thank you

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http://www.ua.pt/idad/